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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/827,379	04/20/2004	Eric R. Fossum	M4065.0628/P628-B	3781
24998	7590	05/17/2006	EXAMINER	
DICKSTEIN SHAPIRO MORIN & OSHINSKY LLP			PIZARRO CRESPO, MARCOS D	
2101 L Street, NW			ART UNIT	
Washington, DC 20037			PAPER NUMBER	
			2814	

DATE MAILED: 05/17/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

10/827,379

Applicant(s)

FOSSUM, ERIC R.

Examiner

Marcos D. Pizarro-Crespo

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 13 March 2006.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 35-48 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 35-48 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 19 July 2005 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)   | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

Attorney's Docket Number: M4065.0628/P628-B

Filing Date: 4/20/2004

Claimed Priority Date: 8/29/2002 (Continuation of 10/230,079)

Applicant(s): Fossum

Examiner: Marcos D. Pizarro-Crespo

### **DETAILED ACTION**

This Office action responds to the amendment filed on 3/13/2006.

#### ***Acknowledgment***

1. The amendment filed on 3/13/2006, responding to the Office action mailed on 12/13/2005, has been entered. The present Office action is made with all the suggested amendments being fully considered. Accordingly, pending in this Office action are claims 35-48.

#### ***Drawings***

2. The drawings received on 7/19/2005 are accepted.

#### ***Claim Rejections - 35 USC § 112***

3. The following is a quotation of the fourth paragraph of 35 U.S.C. 112:

Subject to the following paragraph, a claim in dependent form shall contain a reference to a claim previously set forth and then specify a further limitation of the subject matter claimed. A multiple dependent claim shall not serve as a basis for any other multiple dependent claim. A multiple dependent claim shall be construed to incorporate by reference all the limitations of the particular claim in relation to which it is being considered.

4. Claims 39 and 40 are rejected under 35 U.S.C. 112, fourth paragraph, as being incomplete because the claim on which they depend from has been cancelled. Applicant is required to either cancel or amend the claims to place them in proper dependent form, or to rewrite the claims in independent form.

***Claim Rejections - 35 USC § 102***

5. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

6. Claims 35 and 36 are rejected under 35 U.S.C. 102(e) as anticipated by Zhao (US 6339248).

7. Regarding claim 35, Zhao (see, e.g., fig. 8) shows all aspects of the instant invention including a pixel comprising:

- ✓ A substrate **101**
- ✓ A photoconversion device fabricated in the substrate **101**
- ✓ A charge collection region **103** of the device
- ✓ A first conductivity type reset region **123** formed in the substrate **101**, coupled to the collection region **103**, and configured to apply a reset charge to the collection region in response to a pulsed reset signal applied to the reset region (see, e.g., col.5/ll.30-34)
- ✓ A pulsed voltage source for providing said pulsed reset signal (see, e.g., col.5/ll.30-34)

8. Regarding claim 36, Zhao shows the reset region **123** and the collection region **103** both forming an extended charge collection region (see, e.g., fig. 8), the extended

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charge collection region also being reset by the pulsed reset signal (see, e.g., col.5/ll.30-34).

***Claim Rejections - 35 USC § 103***

9. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

10. Initially, and with respect to claims 37 and 42, note that a limitation in a claim with respect to the manner in which a claimed device is intended to be used does not differentiate the claimed device from a prior-art device if the prior-art device teaches all structural limitations in the claims and it is capable of performing the intended use. *In re Schreiber*, 28 F.3d 1473, 1477-78, 44 USPQ2d 1429, 1431-32 (Fed. Cir. 1997); *Ex parte Masham*, 2 USPQ2d 1647 (Bd. Pat. App. & Inter. 1987). See *Hewlett-Packard Co. v. Bausch & Lomb Inc.* and the related case law cited therein which makes it clear that it is the final product *per se* which must be determined in a device claim, and not the patentability of its functions (909 F.2d 1464, 1469, 15 USPQ2d 1525, 1528 (Fed. Cir. 1990)). As stated in *Best*,

Where the claimed and prior art products are identical or substantially identical in structure or composition, a *prima facie* case of either anticipation or obviousness has been established. *In re Best*, 562 F.2d 1252, 1255, 195 USPQ 430, 433 (CCPA 1977).

11. **Note that the applicant has burden of proof** once the examiner establishes a sound basis for believing that the products of the applicant and the prior art are the same. See *In re Spada*, 911 F.2d 705, 709, 15 USPQ2d 1655, 1658 (Fed. Cir. 1990).

12. Claims 37 and 42, 43, and 45 are rejected under 35 U.S.C. 103(a) as being unpatentable over Zhao in view of Chen (US 6392263).

13. Regarding claim 37, Zhao shows most aspects of the instant invention (see, e.g., paragraphs 6 and 7 above) including:

- ✓ A source follower transistor **151** for outputting a signal representing charge collected in the extended collection region
- ✓ A row select transistor **153** for selectively outputting a signal from the source follower transistor **151**

Zhao also shows the source follower transistor **151** in electrical communication with the extended charge collection region, but fails to show a capacitor in electrical communication with the reset region **123** and the charge collection region for storing charge collected in the collection region. Chen, however, teaches that doing so would reduce the charge injection effect of Zhao's reset switch (see, e.g., col.6/ll.59-61).

It would have been obvious at the time of the invention to one of ordinary skill in the art to include a capacitor in electrical communication with the reset region and the extended charge collection region, as suggested by Chen, to reduce the charge injection effect of Zhao's reset switch.

14. In reference to the language in claim 37 referring to the function of the capacitor, it is noted that Zhao/Chen show all aspects of the semiconductor device according to

the claimed invention (see paragraph 13 above) and that using the capacitor to store charge collected in the collection region is a function that does not affect the structure of the final device. Furthermore, Zhao/Chen's device performs the claimed functions. For example, a first capacitor plate is connected to the photodiode and the second plate is opposite to the first plate. When applying a high voltage to the second plate, carriers generated by the incoming light detected by the photodiode will easily flow to the n-doped region **307**, where the carriers will be stored at the capacitor **450**.

15. Regarding claim 42, Zhao (see, e.g., fig. 8) shows most aspects of the instant invention including a pixel for use in an imaging device, the pixel consisting essentially of:

- ✓ A charge collection region **103** provided in a substrate
- ✓ A reset region **123** in the substrate adjacent to the charge collection region **103** for periodically resetting a charge level of the collection region **103** in response to a reset signal applied to the reset region (see, e.g., col.5/ll.30-34)
- ✓ A source follower transistor **151** for outputting a signal representing charge collected in the collection region **103**
- ✓ A row select transistor **153** for selectively outputting a signal from the source follower transistor **151**

Zhao also shows the source follower transistor **151** in electrical communication with the reset region **123**, but fails to show a capacitor in electrical communication with the reset region **123** and the source follower transistor **151** for storing charge collected

in the collection region. Chen, however, teaches that doing so would reduce the charge injection effect of Zhao's reset switch (see, e.g., col.6/ll.59-61).

It would have been obvious at the time of the invention to one of ordinary skill in the art to include a capacitor in electrical communication with the reset region and the source follower transistor, as suggested by Chen, to reduce the charge injection effect of Zhao's reset switch.

16. In reference to the language in claim 42 referring to the function of the capacitor, it is noted that Zhao/Chen show all aspects of the semiconductor device according to the claimed invention (see paragraph 15 above) and that using the capacitor to store charge collected in the collection region is a function that does not affect the structure of the final device. Furthermore, Zhao/Chen's device performs the claimed functions. For example, a first capacitor plate is connected to the photodiode and the second plate is opposite to the first plate. When applying a high voltage to the second plate, carriers generated by the incoming light detected by the photodiode will easily flow to the n-doped region **307**, where the carriers will be stored at the capacitor **450**.

17. Regarding claim 43, Zhao shows the reset region **123** and the collection region **103** both forming an extended charge collection region (see, e.g., fig. 8). Zhao also shows (see, e.g., col.5/ll.30-34) a voltage source periodically supplying the reset signal.

18. Regarding claim 45, Zhao shows the reset region **123** is doped with an n-type dopant at a first dopant concentration (see, e.g., fig. 8).

19. Claims 41 and 44 are rejected under 35 U.S.C. 103(a) as being unpatentable over Zhao/Chen in view Dasgupta (US 6146939).



20. Regarding claims 41 and 44, Zhao/Chen show most aspects of the instant invention (see, e.g., paragraphs 13 and 15 above) including a capacitor in electrical communication with the reset region and the source follower transistor. As taught by Dasgupta, every capacitor has a capacitance per unit area associated with it. This capacitance may range from 4.3-5.3 fF/ $\mu\text{m}^2$  depending on the choice and thickness of the capacitor dielectric (see, e.g., Dasgupta, col.1/ll.37 and col.3/ll.13-19). Zhao/Chen, however, fail to specify that the capacitance per unit area of the capacitor is between about 5-10 fF/ $\mu\text{m}^2$ . However, the specific capacitance values claimed will not support the patentability of subject matter encompassed by the prior art unless there is evidence indicating such values are critical. "Where the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the workable ranges by routine experimentation". *In re Aller*, 220 F.2d 454,456,105 USPQ 233, 235 (CCPA 1955).

Since the applicant has not established the criticality (see next paragraph) of the claimed capacitance values, and since these values are in common use in similar capacitor in the art, as taught by Dasgupta, it would have been obvious to one of ordinary skill in the art to use these values in the device of Zhao/Chen.

#### CRITICALITY

21. The specification contains no disclosure of either the critical nature of the claimed capacitance or any unexpected results arising therefrom. Where patentability is said to be based upon particular chosen dimensions or upon another variable recited in a claim, the applicant must show that the chosen dimensions are critical. *In re Woodruff*, 919 F.2d 1575, 1578, 16 USPQ2d 1934, 1936 (Fed. Cir. 1990).

22. Claims 46-48 are rejected under 35 U.S.C. 103(a) as being unpatentable over Zhao/Chen in view of Wada (US 6677676).

23. Regarding claims 46-48, Zhao/Chen shows most aspects of the instant invention (see, e.g., paragraph 15 above). Chen also shows that the capacitor **450** is connected to the reset region **307** through an n-type contact region having a second dopant concentration (see, e.g., fig. 4) wherein the second dopant concentration **307** is higher than a first dopant concentration **405**. Chen, however, fails to show the contact region having a higher concentration than the reset region **123**. Wada, on the other hand, teaches that doing so would establish a good electrical connection between the capacitor and the reset region (see, e.g., col.12/ll.28-31).

It would have been obvious at the time of the invention to have Zhao/Chen's contact region having a higher concentration than the reset region, as suggested by Wada, to establish a good electrical connection between the capacitor and the reset region.

### ***Response to Arguments***

24. The applicant argues:

Claim 35 recites, *inter alia*, "a pulsed reset signal applied to the reset region; and a pulsed voltage source for providing the pulsed reset signal". Zhao does not disclose these limitations. To the contrary, Zhao discloses that "the N+ region 125 is connected to a fixed voltage such as the supply voltage **VDD**" (see, e.g., col.5/ll.29-34). Fig. 8 of Zhao also shows the N+ region **123** (reset region) connected to a fixed supply voltage **VDD**. Accordingly, there is no pulsed voltage source providing said pulsed reset signal as recited in claim 35.

The examiner responds:

The limitations in claim 35 recite that a pulsed reset signal is applied to the reset region. As set forth in the present and previous Office action (see, e.g., paragraph 7 above), Zhao's reset region is identified as region **123**. So the fact that region **125** is connected to a fixed voltage does not imply that region **123** is also connected to a fixed voltage. On the other hand, and contrary to applicant's assertion, fig. 8 does not show

region **123** connected to a fixed supply voltage  $V_{DD}$ . It is not the reset region **123** but the source/drain region of transistor **151**, which is connected to the fixed voltage  $V_{DD}$ . See, e.g., fig. 8, where Zhao clearly shows that the reset region **123** is connected to the gate of transistor **151**, while it is the drain of transistor **151** that is coupled to the fixed voltage  $V_{DD}$ . On the other hand, Zhao shows using a pulsed voltage source for providing a pulsed reset signal to the reset region **123** (see, e.g., col.5/ll.30-34).

25. The applicant argues:

Neither Zhao nor Chen, even when considered in combination, teaches or suggests all limitations of claim 42. Claim 42 recites, *inter alia*, "a capacitor in electrical communication with the reset region and the source follower transistor for storing charge collected in the charge collection region". Chen differently adds a capacitor to reduce the charge injection effect of the reset switch and fails to show that the capacitor is in electrical communication with the reset region and the source follower transistor.

The examiner argues:

Zhao shows most aspects of the instant invention. See, e.g., fig. 8, where Zhao clearly shows a reset region **123** and a source follower transistor **151** connected to the region **123**. Zhao, however, fails to show the capacitor electrically connected to the reset region and the source follower transistor. Chen, on the other hand, teaches that connecting a capacitor to Zhao's reset region will reduce the charge injection effect of Zhao's reset switch (see, e.g., col.6/ll.59-61). Connecting Chen's suggested capacitor to Zhao's reset region means integrating a capacitor as part of Zhao's circuit, which means that electrical communication is establish between the capacitor, the reset region, and the source follower transistor.

### **Conclusion**

26. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

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27. A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the mailing date of this final action.

28. Papers related to this application may be submitted directly to Art Unit 2814 by facsimile transmission. Papers should be faxed to Art Unit 2814 via the Art Unit 2814 Fax Center. The faxing of such papers must conform to the notice published in the Official Gazette, 1096 OG 30 (15 November 1989). The Art Unit 2814 Fax Center number is **(571) 273-8300**. The Art Unit 2814 Fax Center is to be used only for papers related to Art Unit 2814 applications.

29. Any inquiry concerning this communication or earlier communications from the examiner should be directed to **Marcos D. Pizarro-Crespo** at **(571) 272-1716** and between the hours of 10:00 AM to 8:30 PM (Eastern Standard Time) Monday through Thursday or by e-mail via [Marcos.Pizarro@uspto.gov](mailto:Marcos.Pizarro@uspto.gov). If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Wael Fahmy, can be reached on (571) 272-1705.

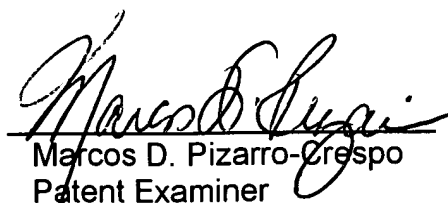
30. Any inquiry of a general nature or relating to the status of this application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status

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information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

31. The following list is the Examiner's field of search for the present Office Action:

Field of Search	Date
U.S. Class / Subclass(es): 257/59,72,222,223,225,228-234,290-294,431-466	5/4/06
Other Documentation: PLUS Analysis	8/15/05
Electronic Database(s): EAST (USPAT, EPO, JPO)	5/4/06

  
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